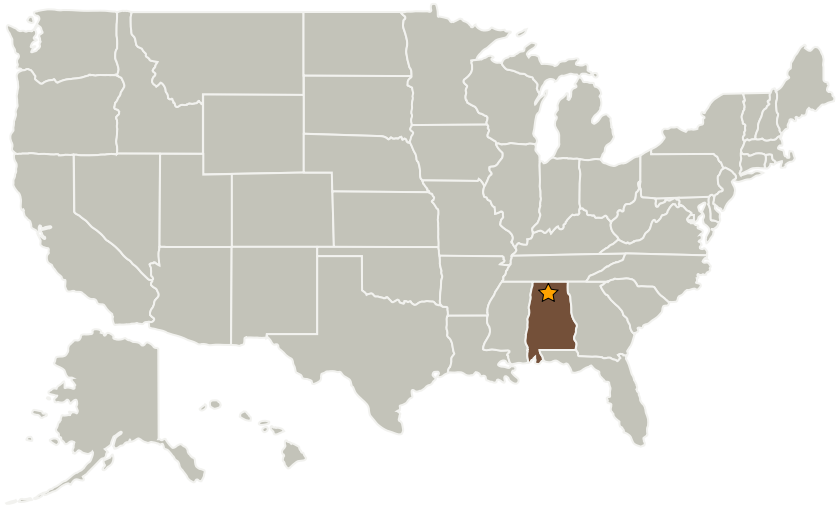
Advanced Materials and Fabrication Techniques for the Orion Attitude Control Motor, Phase I

Completed Technology Project (2009 - 2010)

Project Introduction

The Launch Abort System (LAS) for the Orion Crew Exploration Vehicle (CEV) will provide a safe escape for the crew in the event of an emergency during launch. A key component of the LAS is its Attitude Control Motor (ACM). Recent testing of the ACM valve assembly has resulted in failure during hot-fire testing. These failures are believed to be the result of the molybdenum alloy component distorting during firing. Based on these results, alternative materials with higher temperature capability are needed for the ACM valve assembly. During Phase I, innovative electrochemical forming (EL-FormTM) techniques will be developed for producing ACM hot gas components near net shape. Both rhenium and rhenium coated graphite composite materials will be evaluated. PPI will partner with Southern Research Institute, a leader in the testing of advanced, high temperature materials, for the materials properties testing. During Phase II, ACM hot gas components will be fabricated and hot fire tested. In addition to rhenium and rhenium coated graphite composites, alternative materials such as molybdenum-rhenium and tungsten-rhenium materials will be evaluated.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Plasma Processes, LLC	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Huntsville, Alabama

Primary U.S. Work Locations
Alabama

Project Transitions

January 2009: Project Start

January 2010: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.1 Thermal Protection Materials